
RTO Technical Publications:

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20040040215 Research and Technology Organization, Neuilly-sur-Seine, France

Symposium on Advanced Flow Management, Part A: Vortex Flows and High Angle of Attack for Military Vehicles. Part B: Heat Transfer and Cooling in Propulsion and Power Systems

March 2003; 1200 pp.; In English; In French; Symposium on Advanced Flow Management. Part A: Vortex Flows and High Angle of Attack for Military Vehicles. Part B: Heat Transfer and Cooling in Propulsion and Power Systems, 7-11 May 2001, Loen, Norway; See also 20040040216 - 20040040293

Report No.(s): RTO-MP-069(I)-Pt-A-B; AC/323(AVT-072/073)TP/47-Pt-A-B; Copyright; Avail: CASI; [A99](#), Hardcopy

The principal emphasis of Vortex Flows and High Angle of Attack for Military Vehicles in this symposium is on the understanding and prediction of separation-induced vortex flows and their effects on vehicle performance, stability, control, and structural design loads. In nine sessions the subject was highlighted based on recent and current research and developments for flows with vortical type separation to enhance the overall vehicle performance. Heat Transfer and Cooling in Propulsion and Power Systems was focussed in a complementary way on the internal flow stream control. Propulsion and power systems, for land, sea, and air are normally based on thermal energy cycles as gas turbines, piston engines and rockets. Growing cycle temperatures place severe demands on gas path components and require new and improved cooling technologies for engine components (a.o. compressors, combustors, turbines). Particular emphasis is also put on advanced cooling concepts to meet the demands of lean low emission combustion in transport vehicle engines. The Symposium brought together specialists from Industry, Universities and Research Institutes. It highlighted progress achieved since the last AGARD activities on the subject of the meeting by covering numerical and experimental work as well as flow visualization and in-flight testing. New developments in military applications at industry have been addressed by excellent review papers given from leading industries and research institutes involved. Technological gaps have been identified and trends for future developments were assessed in two technical evaluations at the end of the symposium as a mature basis for future research work and technical applications.

Author

Vortices; Flow Visualization; Heat Transfer

20040045202 Research and Technology Organization, Neuilly-sur-Seine, France

Operator Functional State Assessment

February 2004; 220 pp.; In English

Report No.(s): RTO-TR-HFM-104; AC/323(HFM-104)TP/48; Copyright; Avail: CASI; [A10](#), Hardcopy

The human operator is a crucial component of complex modern systems. The complexity of these systems, the rapid tempo of contemporary military operations and reduced staffing all contribute to the high cognitive demands experienced by military personnel. The rate of information flow, the number of decisions, and actions that must be carried out can exceed the cognitive capacity of the operator. This can result in disastrous consequences. Other system components are continuously scrutinized so that problems can be identified and rectified. The functional state of the human operator is

not monitored and remediation is not implemented. Proper assessment of the functional state of the operator and appropriate intervention will result in improved mission effectiveness. The goal of this report is to assemble the pertinent information concerning the factors that produce suboptimal performance in human operators. Numerous methods are available to detect the presence of these factors. This report provides a comprehensive survey of the risk factors that impact human performance and the assessment methods for measuring these effects. The risk factors include environmental features such as noise, acceleration and thermal stress. States within the individual operator can interfere with optimal performance and include illness, sleep loss and disruption of circadian rhythms. Task characteristics include the cognitive and physical demands of the task. Theoretical concerns are presented as a framework for the risk factors that reduce the functioning of human operators. Methods for detecting impaired operator functional state are presented and include physiological, performance, and subjective assessment procedures. The rationale for each measure is presented along with the technological required to make the measurements.

CASI

Human Performance; Information Flow; Acceleration (Physics); Aerospace Environments; Circadian Rhythms

20040047121 Research and Technology Organization, Neuilly-sur-Seine, France

Optics Microwave Interactions

April 2003; 170 pp.; In English; Optics Microwave Interactions, 2-3 Sep. 2002, Jouy en Josas, France; See also 20040047122 - 20040047132; Original contains color and black and white illustrations

Report No.(s): RTO-EN-028; AC/323(SET-058)TP/42; Copyright; Avail: CASI; C01, CD-ROM; A08, Hardcopy

The following reports were processed for inclusion into the NA&SD database: Microwave Photonics in Dual-Use Military Systems - A Personal Perspective; Optoelectronic Components and Integrated Circuits Including Up and Down Conversion; Technique and Hybrid Integration Technology; Optoelectronic Components and Integration Devices: From Concepts to Applications; Wireless and Optics: A Survey and Overview of Broad Band Fiber-Fed Radio Systems; RF Photonics for Beamforming and Array Applications; Optical Architectures for Signal Processing: Part A; Optical Architectures for Signal Processing: Part B; Opto-Microwave Signal Processing: Up and Down Conversion Techniques; Fiber Optic Distribution Networks for Military Applications; Novel Microwave Photonic Techniques in the Future Military Systems; and Optical Beamforming Networks for Radars and Electronic Warfare Applications.

Derived from text

Photonics; Broadband; Electro-Optics

20040050424 Research and Technology Organization, Neuilly-sur-Seine, France

Analysis of the Military Effectiveness of Future C2 Concepts and Systems

December 2003; 320 pp.; In English; In French; Analysis of the Military Effectiveness of Future C2 Concepts and Systems, 23-25 Apr. 2002, The Hague, Netherlands; See also 20040050425 - 20040050459

Report No.(s): RTO-MP-117; AC/323(SAS-039)TP/32; Copyright; Avail: CASI; A14, Hardcopy

SAS-039 has been commissioned by NATO to conduct a formal review of the revised and extended COBP, and to review current analyses that demonstrate best practices in C2 analyses among member countries. The following materials contain both discussions of the revised and extended COBP, as well as best practices in current C2 analyses. In order to expand the COBP to reflect the full range and complexity of C2, SAS-039 solicited papers on the following topics: Operations Other Than War (OOTW); Novel Command and Control Arrangements; Information Superiority Concepts; Network Centric Concepts; and Distributed/Adaptive C2 Approaches.

Author

Military Operations; Decision Making; Data Processing

20040050624 Research and Technology Organization, Neuilly-sur-Seine, France

RTO Technical Publications: A Quarterly Listing

April 2004; 3 pp.; In English

Report No.(s): RTO-04-01; No Copyright; Avail: CASI; A01, Hardcopy

The titles of five reports are listed here, together with an abstract for each. The titles include: 1) 'Spectral Models of Kuiper Belt Objects and Centaurs'; 2) 'Simulation of and for Military Decision Making'; 3) 'Abundance of the Radioactive Be-10 in the Cosmic Radiation up to 2 GeV/nucleon with the Balloon-borne Instrument ISOMAX1998'; 4)

'Optical Air Flow Measurements in Flight'; 5) 'Flight Test Measurement Techniques for Laminar Flow'.

CASI

Kuiper Belt; Decision Making; Beryllium 10; Abundance; Air Flow; Optical Measurement; Flight Tests; Laminar Flow

20040053390 Research and Technology Organization, Neuilly-sur-Seine, France

Internal Aerodynamics in Solid Rocket Propulsion

January 2004; 468 pp.; In English; RTO/VKI Special Course: International Aerodynamics in Solid Rocket Propulsion, 27-31 May 2002, Rhode-Saint-Genese, Belgium; See also 20040053391 - 20040053401

Contract(s)/Grant(s): N00014-95-I-1338; AGTSR-98-02-SR072; F49620-99-I-0118

Report No.(s): RTO-EN-023; AC/323(AVT-096)TP/70; Copyright; Avail: CASI; [A20](#), Hardcopy; [C01](#), CD-ROM

Considerations of the optimal approaches to adapt space launchers to a changing market should lead to significant breakthroughs in solid rocket propulsion technology, mainly in the areas of reduced costs and improved performance characteristics. The goal of this NATO Research and Technology Organization (RTO) sponsored lecture series was to provide a forum for the review of various scientific and industrial aspects of solid rocket propulsion and an assessment of recent advances with emphasis on internal aerodynamics. The present lecture notes are intended as a natural follow-up to the AGARD-LS-180 Combustion of Solid Propellants organized in 1991. These RTO-AVT / VKI Special Course notes provide the state of the art in internal aerodynamics in solid rocket propulsion, in a way accessible to attendees coming from both academic and industrial areas. Two families of solid motors can be identified: tactical rockets and large boosters for launch vehicles. The military rockets are subjected to combustion instabilities while vortex shedding drives the instabilities in the large boosters. After an overview of the motor internal flow dynamics, combustion of solid propellants and metal particulates were presented. Numerical modeling of internal flow aerodynamics, two-phase flow and flow/structural interactions were addressed, before focusing on the motor flow and combustion instabilities.

Author

Aerodynamics; Solid Propellant Combustion

20040053408 Research and Technology Organization, Neuilly-sur-Seine, France

C3I and Modelling and Simulation (M and S) Interoperability

March 2004; 272 pp.; In English; C3I and Modelling and Simulation (M and S) Interoperability, 9-10 Oct. 2003, Antalya, Turkey; See also 20040053409 - 20040053431

Report No.(s): RTO-MP-MSG-022; AC/323(MSG-022)TP/10; Copyright; Avail: CASI; [A12](#), Hardcopy; [C01](#), CD-ROM

The NATO Modelling and Simulation Group (NMSG) Conference (MSG-022) Command, Control, Communications and Intelligence (C3) and Modelling & Simulation (M&S) Interoperability was conducted in Antalya, Turkey from 9 to 10 October 2003. All sessions of the Conference were unclassified. The Conference audience of 128 persons included experts from NATO countries, Partnersfor- Peace (PfP), as well as invited nations. Nineteen papers were selected for presentation. In addition, two keynote presentations and a capstone paper were given. Interoperability of Command, Control, Communications and Intelligence (C3I) and Modelling & Simulation (M&S) systems is a necessary requirement for effective and efficient support of future military operations, including; procurement, acquisition, test and evaluation, training, and application of necessary functionality within the ongoing operation. In order to be able to support this task, a close understanding and knowledge of the software architecture, the communications protocols, possible interfaces, data and object models, and the management procedures used on the C3I and M&S side is mandatory. The majority of the actual solutions are interface driven to link stove-piped developed legacy systems. The use of common reference models facilitating the necessary data alignment and information exchange is a first step to broader and reusable solutions. Newer systems with configurable interfaces making use of these technical potentials are pointing to the next set of solutions.

Author

Military Operations; Command and Control; Interoperability

20040068014 Research and Technology Organization, Neuilly-sur-Seine, France

Military Data and Information Fusion

March 2004; 328 pp.; In English; In French; Military Data and Information Fusion, 20-22 Oct. 2003, Prague, Czechoslovakia; See also 20040068015 - 20040068040

Report No.(s): RTO-MP-IST-040; AC/323(IST-040)TP/23; Copyright; Avail: CASI; [C01](#), CD-ROM; [A15](#), Hardcopy

This volume contains two Keynote Addresses, 24 papers, and a summary of the final panel discussion presented at the Information Systems Technology Panel (IST) symposium held in Prague, Czech Republic, from 20th to 22nd October 2003. The papers presented covered the following headings: 1) Military Requirements and Experiences; 2) Fusion System Concepts I; 3) Fusion System Concepts II; 4) Fusion Methods; 5) Fusion Methods for Classification and Identification; 6) Semantic Approach to Information Fusion; 7) Applications and Lessons Learned; 8) Applications.

Author

Information Systems; Multisensor Fusion; Military Operations; Communication Networks; Decision Making

20040068168 Research and Technology Organization, Neuilly-sur-Seine, France

Test Methodologies for Personal Protective Equipment Against Anti-Personnel Mine Blast

March 2004; 214 pp.; In English

Report No.(s): RTO-TR-HFM-089; AC/323(HFM-089)TP/51; Copyright; Avail: CASI; [A10](#), Hardcopy

The protection of dismounted soldiers against anti-personnel (AP) land mines has been a focus of Military Forces for many years. Since World War II, a significant amount of resources has been invested in developing personal protective equipment (PPE) against this threat. However, the past ten years has seen an intensified effort to solve the problem, which has led to the emergence of new PPE. It was soon recognized that common international procedures to evaluate and assess the performance of this equipment was needed. In 2000, the NATO RTO decided to pool the knowledge and experience of its members to develop a common understanding of the physics at play during a mine explosion and the resulting human injuries. This database would then be used to define common methods to test PPE against AP mines. This was the mandate of Task Group HFM-089/TG-024. This report presents the results of TG-024. It provides background information about mine explosions and the injuries they inflict on their victims. This sets a reference against which the reader can assess the discussion on test methodologies. This discussion is broken down in three sections. The first describes the basic elements that a test methodology must have. The second addresses methods designed to test PPE that protects the lower extremities. The third is focussed on PPE that protects the upper body. Following this discussion, the report presents the TG recommendations with respect to test methods for the assessment of PPE performance against AP blast and fragmentation mines. Finally, conclusions are presented along with a brief recommendation for future work. The report is supplemented with several annexes that contain information relating to mines, past experience of the participating nations, mine injuries, etc., which were too detailed for inclusion in the main text.

Author

Explosions; Protection; Protectors; Military Personnel; Protective Clothing; Mines (Ordnance); Performance Tests

20040075615 Research and Technology Organization, Neuilly-sur-Seine, France

Massive Military Data Fusion and Visualisation: Users Talk with Developers

April 2004; 226 pp.; In English; Massive Military Data Fusion and Visualisation: Users Talk with Developers, 10-13 Sep. 2002, Halden, Norway; See also 20040075616 - 20040075639

Report No.(s): RTO-MP-105; AC/323(IST-036)TP/20; Copyright; Avail: CASI; [C01](#), CD-ROM; [A11](#), Hardcopy

The initiating NATO research group IST-021/RTG-007 (Multimedia Visualisation of Massive Military Data Sets) argues that visualisation is a lot more than the display of graphics on computer screens. Visualisation happens in the head of the user, and effective visualisation displays might be textual or pictorial, and might involve other modalities in addition to the visual. In its thinking about visualisation, IST-021/RTG-007 uses a reference model based on a three-level feedback process (see www.vistg.net). The participants at ITS-036/RWS-005 military users, system developers, and human factor scientists addressed the main issue of human information overload , but by disparate approaches. Data fusion uses algorithmic data reduction, whereas visualisation deals with displaying the data in comprehensible form. Presentations by experts in data fusion indicated that visualisation might have a much broader influence than just better presenting the outputs of data fusion algorithms; one example is to improve the human ability to direct sensor- and computer-resources.

Derived from text

Multisensor Fusion; Visual Perception; Decision Making; Information Systems